SCIENCE NEWS-LETTER

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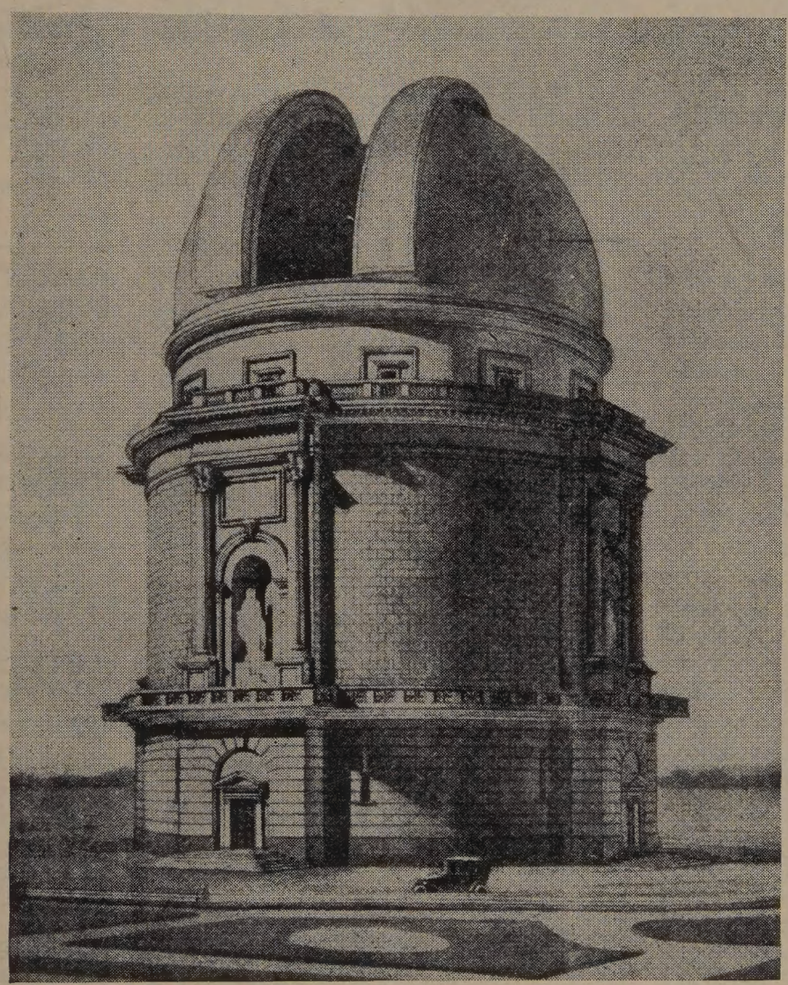

A NEW URANIBORG

Many Telescopes in One

(*See page* 111)

Vol. XIV *No. 885*

Visits Unconquered Maya Tribe

Archæology

One member of the Tulane University Expedition, which left last January, 1928, to explore unknown parts of the Maya area in southern Mexico and Guatemala, has returned to civilization, while the others are still somewhere in the brush.

Carlos Basauri, ethnologist of the expedition and representative of the Mexican Department of Education, has just returned to Mexico City via Yucatan, but without Frans Blom, leader of the expedition, and the other members, with whom he parted company in the Peten region of Guatemala over a month ago. Mr. Blom, looking for archæological ruins, decided to make his way straight north through the almost unpopulated areas, while Señor Basauri, interested in people, was to make his way to the inhabited parts. The two had designated three meeting places in Quintana Roo and Yucatan, but each time Mr. Blom failed to be on the spot.

Senor Basauri made ethnological studies upon various of the Maya races which the party encountered, and succeeded in getting to Santa Cruz, Quintana Roo, the capital of the famous unconquered Maya tribes who have successfully defied the white man from the time of the Conquest four centuries ago to the present day. They are the living remainder of the Maya Empire and made their last effort to drive the whites out of Yucatan only about 80 years ago, during the cruel "War of the Castes," in which they nearly succeeded. But eventually defeated, they withdrew to their jungles where they remain today resisting the white man and his civilization to the last.

The governments of Mexico, since 1910, have made friendly overtures to these Indians with the hope of "incorporating" them in the republic, for there are many people who see in races with such determination one of the hopes of future Mexico. The Indians are now only nominally under the Mexican government, having their own chief, Mai, called "General" Mai, by the courteous Federal Government, to make it look better. All of Señor Basauri's experiences in the land of the unconquered Indians were not pleasant, but he succeeded in getting certain anthropological measurements, which is the first time these have been made.

Señor Basauri also brought with him the scraps of prehistoric Maya fabric which the expedition found early in the season in a cave in southern Chiapas, within the area of the old Maya Empire. Only one other prehistoric example of Maya textile exists, as far as is now known, and that is in the Peabody Museum of Harvard University.

Science News-Letter, August 25, 1928

Volcano Explodes

Volcanology

The world's weather during the coming months may show effects of the violent explosion of Rokatinda volcano on the island of Paloweh in the Dutch East Indies. Prof. W. J. Humphries of the U. S. Weather Bureau stated that if the explosion was violent enough to cast a large volume of fine volcanic dust into the upper air, this cloud may drift clear around the earth, cutting down the sun's radiation and notably affecting the temperature. "It is too early now to tell, but in a month we ought to know," he said. "By that time if the volcano did create a dust cloud it will have had time to get distributed, and we shall begin to see its first effects in a lot of extra brilliant sunsets."

There are two types of volcano, Prof. Humphries explained. One type, of which Kilauea is an example, never explodes, but at times wells forth great quiet rivers of lava. The other type, like Katmai in Alaska, goes off with a bang and hurls clouds of fine dust miles upward into the air. The East Indian volcanoes are of this type, and the eruption of Rokatinda seems to have been of this explosive nature. Two of the worst volcanic disasters of history have occurred in this same general region: the explosion of Krakatoa in 1883, which killed 36,000 persons, and the explosion of Tambora in 1815, which wiped out over 56,000.

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All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

Age of Man Has Not Yet Arrived

Entomology

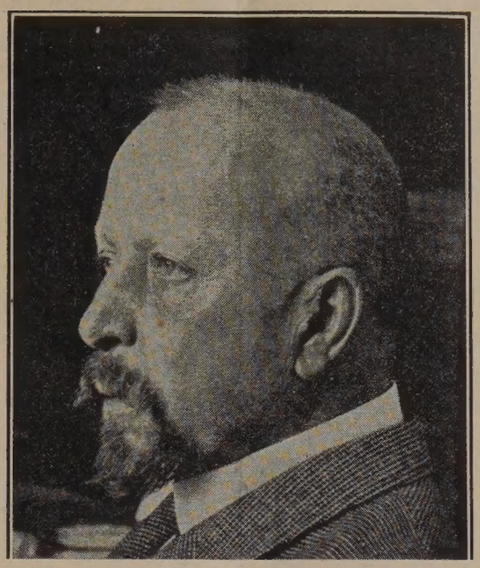
Following are the first reports of the Fourth International Congress of Entomology, held at Ithaca, N. Y., August 12-18. Further material will be contained in next week's issue of the SCIENCE NEWS-LETTER.

War between Humanity and the Hexapods was pictured in unfamiliar colors before the opening session of the Fourth International Congress of Entomology. The president of the Congress, Dr. L. O. Howard of the U. S. Bureau of Entomology, pointed out that the prevalent conception of an Age of Man finding its supremacy threatened by a looming Age of Insects is not accurate. The world is still in the Age of Insects, he said, and the Age of Man is not yet established. Taking into account the facts now known about evolutionary history, we must look upon the insect world as the old established order, an animal hierarchy of such excellently ancient lineage that it can count even the dinosaurs as a race of upstarts that had their day and ceased to be. It is the race of men, and not only they but all of their warm-blooded relatives, who must be looked upon as the invaders, as the attackers, as those who seek a place in the sun at the expense of the present landlords.

Since man is the aggressor in this campaign, Dr. Howard argued, it is up to him to justify his claim to existence and to possible final dominance. To this end he must use his unique gift of intelligence and make his knowledge of the ways of his six-legged enemies outweigh the numerical odds arrayed against him.

A paradox of pesticulture, wherein man encourages insects to prey on plants, prevails in the Antipodes. The secret of it is, that the plants are weeds, and in devouring them the ertswhile pests are unwittingly serving their cleverer opponent. This biological control of troublesome weeds is developing into a distinct branch of entomological science, which was discussed at the Congress.

The discussion also served to illustrate the fact that Britain's far-flung battle line exists in other fields than the military. The three men who with their assistants are cooperating to fight the weeds of Australia and New Zealand are Dr. R. J. Tillyard of Australia, Dr. Ernest Marsden of New Zealand and Dr. A. D. Imms of England. Australia's most terrible weed is the common prickly pear cactus, introduced from America. To prevent it from completely overrunning warmer parts of the island, the



DR. L. O. HOWARD, President of the Fourth International Congress of Entomology

cactus regions of the United States were combed for insects that would eat cactus and nothing else. The search has been very successful, and the Australian cactus pest is now well under control. The many-legged allies of man in this fight against a vegetable include the cochineal bug, cultivated in Mexico for a red dye, several other true bugs, the caterpillars of three moth species, and a variety of the almost microscopic red spider.

In New Zealand there are three introduced weeds that are very troublesome, the common blackberry, the European gorse, and the ragwort, a plant allied to the dandelion and quite poisonous to live stock. A moth species has been found whose caterpillars will take care of the ragwort situation, and a weevil on the gorse gives promise. A caterpillar has been tried out for the blackberry pest, and a beetle whose grubs bore into the stems may also be useful.

This introduction of destructive insects to prey on weeds is admittedly a ticklish job, for if one of them should turn on an economic plant instead of the weed for which it is intended, the remedy might itself become a scourge. However, the insects are all kept most carefully caged until they are tried out on all possible diets in addition to the one for which they are imported, and if they show a taste for a valuable plant they are at once destroyed. This period of quarantine also serves to clear the insects of their natural parasitic enemies before they are released. As an insurance measure, however, a stock of parasites of each species is kept available, so that if one of the devourers should go wrong it could have a counter-attack launched against it.

For the warfare on the home front, here in the United States, chemists are seeking new weapons. The arsenates of lead and of copper, or Paris green, which are the staples of present-day Borgian banquets for bugs, may soon be varied with arsenates of other metals, such as aluminum, iron, magnesium, barium, and zinc, with additions of such things as thallium sulphate, copper cyanide and various fluorides and fluosilicates. In addition, stated Dr. R. C. Roark, of the Bureau of Chemistry and Soils of the U. S. Department of Agriculture, some 400 patented moth-proofing compounds are being investigated for their possible usefulness in man's chemical warfare against the insects.

Warfare against insects whose bites or stings plant deadly germs in the human system, occupied much of the attention of the members of the Congress. Dr. R. R. Parker of the U. S. Public Health Service outlined the results of researches on Rocky Mountain spotted fever which he and his colleague, Dr. R. R. Spencer, have been carrying on in Montana.

This dangerous disease is curiously uneven in its behavior, Dr. Parker said. In parts of Montana 90 per cent. of all persons who take it die, while in another region, in the neighboring state of Idaho, only 5 per cent. of the cases terminate fatally. There is no effective treatment once the disease has been contracted, and no control measures have been devised against the ticks whose bites initiate the attack. During the past few months, however, the effectiveness of a preventive serum has been conclusively demonstrated. It prevents mild forms of the disease altogether, and usually checks the course of the severer attacks. It also cuts the death rate very materially. Among the twelve cases contracted in a group of 5000 serum-treated persons only one death occurred, while among eighteen cases contracted by non-treated persons during the same time fifteen deaths occurred.

The ill account of the tick that carries spotted fever germs is not closed with this indictment. The same crawling menace also harbors tularemia, "tick paralysis", (*Turn to next page*)

Age of Man Not Yet Arrived—*Continued*

and possibly one other disease of man, as well as sheep tularemia, and the "tick paralysis" of sheep and cattle. A parasitic wasp, which destroys the young of ticks, has been brought from France to combat this pest, but experiments with this helpful insect are as yet only in the beginning stages.

The weather man should be called into the alliance now existing between the entomologist and the medical scientist, according to Dr. Erich Martini of Hamburg, Germany. He called attention to the need for a better understanding of climatic factors as they affect insect-borne diseases. Sometimes the problem is relatively simple: frosty weather kills flies, and so abates fly-borne plagues, such as some types of dysentery and some epidemics of typhoid fever. But sometimes the operation of climatic factors is not so easily understood. The peak of the annual spread of tertian malaria, for example, comes before the warm weather that is most favorable for mosquitoes. This, upon investigation, seems to be because the malaria germ itself is better able to carry on its mischief-making in moderately warm than in very warm weather. For this reason Dr. Martini urged more exact study of climatic factor complexes in laying out anti-insect campaigns.

Prof. W. J. Baerg of the University of Arkansas, noted among entomologists as the man who has the nerve to let tarantulas, scorpions and centipedes bite and sting him, detailed the results of his first-hand experiences with arthropod poisons. Most of the poisons of spiders and their ugly-looking relatives, he said, are greatly overrated. A centipede bite, even from a big specimen, is about as painful as a bee sting, but no more harmful. The same is true of most tarantulas—and it is usually hard to get a tarantula to bite at all. The much smaller Black Widow spider of the South is equally reluctant to bite, but its venom is much more wicked in its effects. A Black Widow bite once put Prof. Baerg to bed for three days of rather pronounced illness. But, he added philosophically, it gave him and his attendant physicians a good chance to get an authentic record of the symptoms.

Prof. Baerg has just returned from Durango, Mexico, where he has been investigating the notorious Durango scorpion, which has the reputation of a killer. There is no doubt, he said, that this creature is very poisonous, and that it has claimed the lives of a good many human victims, especially among children. Adults it makes sick, but seldom kills. The poison causes a paralysis of the respiratory system. Mexican medical men have recently developed a curative serum which promises to rob the sting of this scorpion of most of its terror.

Meet Trichogramma minutum. This little insect is a great friend of the human family. Most of us do not know her, because she is too small to be seen, as she goes about the world, doing good to us and ill to our enemies.

Trichogramma is one of those interesting though tiny insects that lays her eggs in the eggs of other and larger insects that eat man's crops and orchards. The grubs that hatch out of such parasitic eggs prey upon the larger eggs in which they are laid, and so destroy them. Some of these egg parasites are quite particular, patronizing the eggs of only one group of victim-insects; but Trichogramma is not at all fussy. That is what makes her so useful. She will lay her egg within the egg of any other insect she can get at that is large enough and not too hard-shelled.

To date she has had to take her own chance in the wild state, so that in an unfavorable season there were not enough of her sisterhood to take care of the eggs of the teeming pests. Now, however, she has been taken in hand and brought up in huge numbers in captivity. The method followed by Stanley E. Flanders, of Saticoy, Calif., is simple. He first breeds a lot of pests—grain moths—in 40 to 50 bushels of wheat. Then he lets the Trichogramma mothers loose at their masses of eggs. Presently he has perfect clouds of Trichogramma insects, which he then carries out into the California walnut orchards, to mop up the codling moths.

A new technique in the handling of another insect friend of man, which has been reared much longer in captivity, was demonstrated by Dr. Lloyd R. Watson, of Alfred, N. Y. He has worked out a way of artificially fertilizing queen bees, which will make it possible to breed bees as accurately and scientifically as we now breed cattle. Hitherto the fertilization of the queen has been a matter of chance. The young queen flies out of the hive, mates with any drone she may meet in the air, and returns to take up her duty of laying thousands of eggs. But beekeepers have never known what the father of the new brood was like. By Dr. Watson's method, which involves the use of microscopic glass tubes of unimaginable fineness, the process is made largely mechanical, and the drone that is to be the father of the bee colony can be selected just as accurately as can the queen that is to be the mother.

A poultry raiser is glad enough to see one chick or duckling hatch out of one egg. He would become somewhat pop-eyed if one egg should suddenly provide him with a whole yardful of fowls. But that, in effect, happens in the insect world, according to Dr. R. W. Leiby of the North Carolina Department of Agriculture.

The insect group in which this strange phenomenon occurs, Dr. Leiby explained, constitutes a winged clan friendly to man in his warfare with the creeping things that take toll of his crops and orchards. They are tiny wasp-like insects, that lay their eggs in the bodies of caterpillars and other insect larvae, so that their young, when they hatch out, feed on the tissues of this unwilling host until it dies. Obviously, it is often a bit difficult to deposit an egg in a writhing and terrified caterpillar, so that if one egg can be called upon to do the work of many it will be a great advantage to the species.

And that is what happens. Normally an egg divides into two cells, four cells, eight cells, many cells; and these many organize themselves into a single complete insect larva or grub. The eggs of this group of little wasps, however, do otherwise. In one species the egg divides into two cells, and each of these two then proceeds to subdivide and organize normally, so that twin insects always result. In a cousin species the division goes on until there are 10 or 20 cells before the normal development begins. In a third species one egg develops into 150 individuals, while the egg of the no-race-suicide champion of the whole tribe eventually gives rise to as many as 2,000 young insects.

Science News-Letter, August 25, 1928

Only three states were entirely free from smallpox last year: Connecticut, Vermont, and New Hampshire.

New Telescopes for New Universes

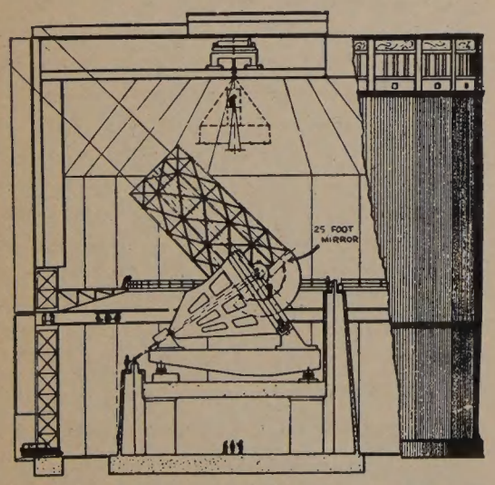
Astronomy

By James Stokley

Huge new telescopes, already planned, will reveal thousands of "universes" of stars now beyond our reach. Probably it will not be long—a year or so, perhaps—before the construction of one of these great instruments is actually begun. Already such large instruments as the 100-inch reflector at Mt. Wilson, now the world's greatest, can reach out and record on the astronomer's sensitive photographic plates objects so distant that their light started on its way millions of years ago when the earth was in the making.

But these big telescopes will not only be useful for revealing heavenly objects now beyond the reach of astronomers. They will be just as useful in revealing the closer objects with a now unobtainable wealth of detail. Mars will be brought so close that the mystery of its canals should be definitely settled when the telescope is first turned on that neighboring planet. Through the projected telescopes Jupiter will appear greatly enhanced in size. As compared with its appearance through present large instruments, the improvement will be as striking as was Galileo's first telescope sight of it in 1610 contrasted with the best naked-eye view of previous days!

About ten years ago there was built, for the Dominion Astrophysical Observatory, at Victoria, B. C., a modern reflecting telescope with a six-foot mirror. This was of American construction, for the mounting was made in Cleveland and the mirror in Pittsburgh. The Victoria telescope was thus the largest in the world at the time of its completion in 1918.



PRELIMINARY PLANS prepared by Francis C. Pease for a telescope with a twenty-five foot mirror, using a mounting originally devised by Russell W. Porter, of Springfield, Vt.

It did not hold this position long. The following year the 100-inch reflector of the Mt. Wilson Observatory in California was completed and placed in operation, and since then it has held the record.

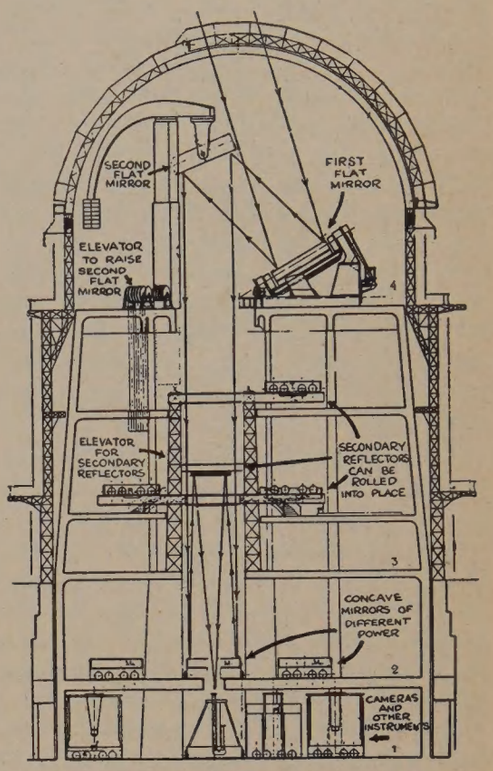
In the years since its completion, the two men most concerned with the design and construction of the 100-inch have both been working on methods of making still larger instruments. One is Prof. George W. Ritchey, who built the 60-inch telescope at Mt. Wilson and who made the optical parts of the 100-inch; and the other is Francis G. Pease, who designed the mechanical parts of the latter instrument.

A year or two after the 100-inch was completed, Prof. Ritchey left Mt. Wilson and went to France. There plans were being formulated for a great telescope, larger than any in the world, that was to be built on Mt. Saléve in the French Alps. Prof. Ritchey was given space for a laboratory at the Paris Observatory, and a large staff of assistants, with whom he began to work out new ways of making great mirrors, as well as new designs for such an instrument.

Unfortunately, the funds for this great observatory were not forthcoming, and so the plans have been dropped—at least so far as the Mt. Saléve institution is concerned. But in the years that he has spent in Paris Prof. Ritchey has had the opportunity of working out the best designs for large observatories, as well as actually constructing and testing a mirror made on entirely new principles. One improvement involves making the mirror with a structure something like a honeycomb. Another is in the curve that the glass is given.

In the past a mirror has always been made of solid glass. The disc from which the 100-inch mirror was made was, for instance, 101 inches in diameter, 13 inches thick, and weighed nearly five tons. Though it was not a perfect piece of glass, it was used because the makers, at Saint Gobain, France, were unable to cast a perfect disc of the required thickness.

The huge piece of glass is poured while molten and very hot in a mold to give it the necessary disc shape. Since glass transmits heat very slowly, it must be cooled very slowly. Otherwise, the outer layers would cool rapidly, then the inside, with the result that the disc would break into small pieces. In cooling such a disc it is annealed, by lowering the temperature very gradually. It may take as much as a year for it to cool. Usually during this time the disc is buried in sand.



PLAN OF TOWER REFLECTING TELESCOPE designed by Prof. George W. Ritchey, formerly of the Mt. Wilson Observatory, and intended to use mirrors twenty-five feet or more in diameter

Several attempts were made to cast a disc for the 100-inch. The huge pots of glass were prepared, then poured into the molds, and the cooling begun, only to find months later, when the disc was uncovered, that it had cracked in the annealing. Finally, a disc was safely brought through this critical stage. It was the required thickness, but in casting it, three separate pots of glass had been used. One after the other had been poured into the mold. In this process layers of air bubbles had been carried to the mold, so when the disc cooled it was like a three-story layer cake, with air bubbles for the filling.

Even though it was defective, the disc seemed to be the best that could be obtained, so it was sent from France to Pasadena, where the observatory shops are located. The authorities saw the bubbles and rejected it, sending word (*Turn to next page*)

New Telescopes for New Universes—*Continued*

to Saint Gobain to try again. Try again they did, and finally did cast a perfect disc seven inches thick, but failed to make one of 13 inches. The seven-inch-thick disc was considered too thin, so the observatory authorities looked at the one with the bubbles. After tests, they found that in making it of the necessary dish-shape, they would not reach one of the bubble layers, and so they would not interfere. In 1910, under Prof. Ritchey's direction, the work of grinding began, to be completed six years later. Within a few years more the mounting had been completed.

With so much difficulty involved in making the glass for the 100-inch, it became apparent that still larger ones would be nearly impossible. Since that time there have been great improvements in glass making. At the United States Bureau of Standards, in Washington, a large disc has been successfully cast for a reflecting telescope in Ohio. Mr. Pease thinks that a disc as large as twenty-five feet in diameter could be cast now. Probably, he thinks, it could be done with Pyrex glass, which has in recent years been widely used for cooking utensils and glassware used in laboratories. This glass has the advantage of standing sudden and large changes in temperature remarkably well.

However, it cannot be denied that the casting of a disc so large would be attended with considerable difficulties, even though they could doubtless be overcome. Prof. Ritchey has therefore worked out another method of making large mirrors. The trouble in making the large discs is to get them of large diameter, and at the same time sufficiently thick. A piece of glass only an inch or so thick could easily be made as large as desired, but a disc so thin could not be used for a mirror. Glass is slightly flexible and it would bend enough to throw the image out of focus when in use.

Prof. Ritchey's method is to provide a support for such a thin mirror. He takes a thin, flat piece of glass of the required diameter. On top of this he cements vertical partitions of thin glass in the same form as the cardboard partitions in an ordinary egg box. The tops of the glass partitions are lower in the center, so as to correspond to the eventual concavity of the mirror. On the top he then cements a thin, round, dish-shaped piece of glass of the same diameter as the lower one. The entire

PROF. GEORGE W. RITCHEY, examining glass blank for telescope mirror

structure is baked to harden the cement, which is an invention of Prof. Ritchey's, and then the top surface is ground to the proper concavity.

When a glass is made in the form of a disc, it must first be rough-ground to a shape that is part of a sphere. Then comes the figuring, which makes it into a paraboloid, like the reflector of an automobile headlight, only much flatter. The Ritchey mirror is already in the spherical shape when it comes out of the furnace in which the cement is baked hard, so that only the figuring is required. Another advantage of such a mirror is its lightness. Also, as he puts holes in the partitions and air can circulate freely through the inside of the mirror, it can soon be brought to the same temperature as its surroundings. With a large solid mirror, especially in warm weather, it is likely to become hot during the day. Then at night, when the astronomers want to use it, it becomes cooler, and until it has cooled to the same temperature as the air around it, it cannot be satisfactorily used.

Prof Ritchey's first mirror of this kind, a small one, was made while he was in the United States. In Paris he made one of a fairly good size—about forty inches—and one of the same size out of solid glass. Thus he could compare their performance. These he made several years ago, and immediately made on them an exhaustive series of delicate tests, which showed that the built-up mirror gave just as good an image as the solid one. But there seemed the possibility that the composite affair might change with time, that it would not hold together satisfactorily. If such a change would occur, it should now be evident. He had just completed a second series of comparative tests of the two mirrors, and these show that the composite one is still entirely satisfactory.

But a reflecting telescope is more than a mirror. There must be a mounting for it, so that it can be pointed at the stars and bring the light rays to the photographic plate. In a large telescope such a mounting is a formidable affair. The moving parts of the 100-inch telescope weigh something like 200 tons. A larger telescope might be made out of some light and strong alloy, like duralumin, which has been employed in our large dirigibles. Even so, the mounting for a mirror of twenty-five feet or more diameter would be rather a considerable engineering problem.

The telescope that Mr. Pease has designed and which, he announces, can be started just as soon as the funds—about $12,000,000—are in hand, follows the usual principle of moving the entire instrument to point to the star. The mounting he has designed is one that is particularly adapted to large instruments. It was originally proposed some years ago by Russell W. Porter, an amateur telescope maker of Springfield, Vermont.

But there is another way of using a large mirror, and one which Prof. Ritchey thinks to be the ideal method. He has worked out a design for a large telescope which also follows the orthodox method. By the use of new curves that are neither paraboloids or spheres, he has found a way of making the instrument much shorter, and hence lighter, than in a telescope such as the 100-inch. His ideal, however, is a form of what astronomers call the coelostat telescope. In this a pair of flat mirrors at the top of a tower pick up the light from the heavenly body and reflect it into a fixed and vertical telescope. Two such telescopes, but using lenses, and not mirrors, are already in use at Mt. Wilson for studying the sun. Another one, also using a lens, is used for both sun and stars at Potsdam, Germany.

Prof. Ritchey has designed such a telescope for use with great mirrors. The first mirrors at the top are much easier to turn than a huge telescope, and so it is much more convenient to use. But one of the principle advantages, in his estimation, comes from the fact that a whole battery of mirrors can be used. Instead of one, as in all present instruments, a half-dozen or so, each with a different focus and magnifying a different amount, can be kept constantly at hand. Nights vary. Sometimes the atmospheric conditions are such that only a lower power may be used to advantage. Then conditions (*Turn to next page*)

New Aurora Mystery

Physics

Photographs made at the Lowell Observatory at Flagstaff, Ariz., of the spectrum of the Northern Lights at the time of the brilliant display on July 7 has opened up a new scientific mystery. For the first time, there appears, in addition to the various lines due to known elements, a very prominent line in the red region of the spectrum. As it has never before been photographed, Dr. V. M. Slipher, director of the observatory, who recorded it, is unable to state definitely what elements cause the reddish color. However, he suspects that it is due to some known gas in the atmosphere of the earth, possibly nitrogen.

On the photographs taken by Dr. Slipher there also appeared very prominently the so-called green auroral line, which was long a mystery. First photographed during visible displays of the northern lights, or aurora borealis, it was found at the Lowell Observatory in 1915 that it could be recorded by pointing a spectrographic camera at any part of the sky on any night even if cloudy. Dr. Slipher has also made such photographs of it on numerous occasions and under all sorts of sky conditions, always with success. He finds an unaccountable variation of its intensity shown even in a few minutes.

Science News-Letter, August 25, 1928

New Telescopes—*Cont'd*

of almost perfect "seeing" may arise for a time. With the Ritchey telescope, the highest power could be put in place in a moment, and the fullest advantage taken of the exceptional conditions. Thus the telescope would always be used at its greatest efficiency. Another advantage is that the observing chamber could be underground. All sorts of instruments, like spectroscopes and plateholders could be kept at hand like the mirrors, ready to slide into place at a moment's notice.

So far no estimate has been made of the cost of such an instrument, but it would undoubtedly run well into millions and millions of dollars. Its cost might even approach the cost of a modern battleship! And how much more useful in the development of mankind, in the extension of human knowledge, would such an instrument be than a whole fleet of dreadnaughts!

Science News-Letter, August 25, 1928

The average height of the human race is five feet five inches.

Radiovision in Homes This Fall

Radio

Radiovision and radiomovies will be received in thousands of homes during the coming winter. Thousands of amateurs and radio enthusiasts will build their own radiovision receivers and early this fall ready-made radiovisors will come on the market. Radiovisors will be the novel and really smart Christmas gift this year. These are the predictions of those behind the scenes in radio experimentation.

Although only three radio stations are regularly broadcasting radiovision or radiomovies, at least seven more are experimenting or testing and installing radio transmitters. The fall months will see this number increased rapidly.

At present most of the radiomovies are in pantomime only but increase in "picture quality" will come with experience and perfection of transmitting methods. The recent assignment by the Federal Radio Comission of new and wide bands of short waves for radiovision will spur on the development.

At present radiovision is in a state corresponding to the crystal set days of sound radio in 1921. But the growth of radiovision will be faster than was the growth of sound radio. Thousands have learned to use tools and make their own radio sets. The vogue of home construction of radio sets has waned because it became unprofitable and uninteresting with the growth of the radio industry. Now the latent mechanical urge of the radio fan is likely to be liberated by radiovision and the construction of radiovisors is likely to become a new home occupation.

The well-organized radio set manufacturers, alert for new things to sell, are also expected to place de luxe radiovisors on the market in a remarkably short time this fall.

In the early days of radiovision only the expert amateurs and set builders are likely to obtain consistent and satisfactory results because of the fact that most of the radiovision broadcasts are now on wave lengths shorter than the usual music and speech broadcasts. Their pioneering, however, will make the day of radiovision in the ordinary parlor come sooner.

Science News-Letter, August 25, 1928

Radiovision Programs

Radio

3XK, Washington, D. C., Jenkins Laboratories, 46.7 meters, 6420 kilocycles. 48 lines per picture. 15 pictures per second. Monday, Wednesday and Friday, 8 to 9 p. m. Eastern Standard Time. Radiomovies.

WGY, Schenectady, N. Y., General Electric Co., 380 meters, 790 kilocycles. 24 lines per picture. 20 pictures per second. Tuesday, Thursday and Friday, 1:30 to 2:00 p. m. Eastern Daylight Time. Tuesday, 11:30 p. m. to 12 midnight. Sunday, 10:15 to 10:30 p. m. Sunday and Friday transmission is simultaneously on 21.96 meters or 13660 kilocycles. Thursday and Tuesday transmission is simultaneously on 31.4 meters or 9550 kilocycles.

WRNY, New York City. Experimenter Publishing Co. 326 meters, 919 kilocycles. 36 lines per picture. 10 pictures per second. To be on regular schedule shortly.

2XAL, New York City. Short wave station of WRNY to broadcast same programs simultaneously on 30.91 meters, 9700 kilocycles.

KDKA, short wave transmitter, Pittsburgh, Pa. Westinghouse Electric and Manufacturing Co. 62.5 meters, 4798 kilocycles. 60 lines per picture. 16 pictures per second. Irregular broadcasts for experimental purposes.

1XAY, Lexington, Mass. Donald R. Laffin. 51 to 62 meters. 4700 to 4900 kilocycles. 48 lines per picture. 15 pictures per second. Nightly tests without regular schedule.

4XA, Memphis, Tenn. Wrec, Inc. 125 to 120 meters. 2400 to 2500 kilocycles. 24 lines per picture. 15 pictures per second. 5000 watts power. Irregular experimental schedule.

9XAA, short wave station of WCFL, Chicago, Ill. Chicago Federation of Labor. 6215 meters. 4800 kilocycles. 48 lines per picture. 15 pictures per second. Monday, Tuesday, Wednesday, Thursday and Friday, 10 to 11 a m. Broadcasting only frequency chart now but will broadcast movies when equipment is ready.

Science News-Letter, August 25, 1928

Any "Leica" Negative can be enlarged to 12 x 18 inches

Leica

It Uses Standard Cinema Film

"The Universal Camera"

IDEAL FOR EXPEDITIONS

The Official Equipment of the University of Michigan Greenland Expedition includes several "Leica" Cameras

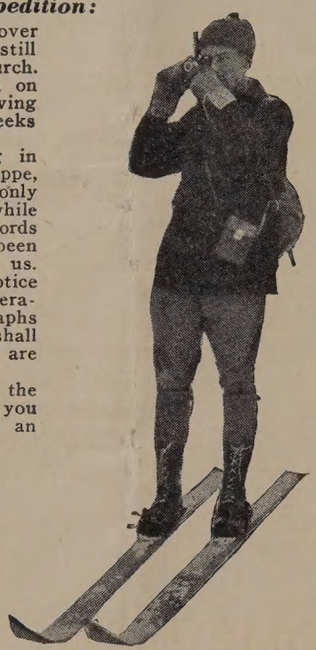
Thus writes the Official Photographer of the Expedition:

Your letter addressed to Dr. J. E. Church was turned over to me and I wish to say that the "Leica" Camera is still in active service above the Arctic Circle with Dr. Church. From the last reports by wireless, he should be well in on the great ice cap with Mr. Bangsted and one Eskimo, having started from the observatory with dog-team some three weeks ago

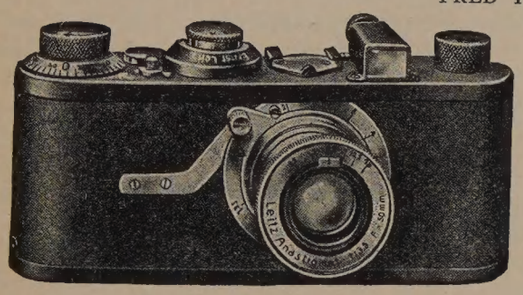
A "Leica" Camera, which I purchased before starting in April, 1927, from your agents, Messrs. Spindler and Sauppe, was my constant companion on the entire trip. It not only gave excellent results both on the inland ice trip and while constructing the observatory, but allowed us to take records of our progress and photographs that would not have been possible with any of the other six cameras we had with us. Pictures were often obtained on less than three seconds' notice and the quick action as well as convenient and accurate operation of the camera made this possible. Over 1,500 photographs were taken this summer with the two cameras and I shall send some prints to you as soon as the enlargements are completed.

According to present plans, Dr. Church will return to the United States some time in October, 1928, and will write you personally. Assuring you that the "Leica" Cameras were an invaluable part of our equipment, I remain,

Very sincerely yours,
FRED HERZ.

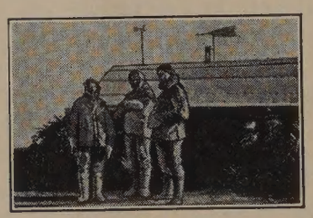


Fred Herz himself with his "Leica"



The Smallest Roll-Film Camera with Focal-Plane Shutter

"Snapping Scenes as we went along"



One of the many thousand "Leica" pictures taken by the expedition

The "Leica" proves ideal under all climatic and adverse conditions. The "Leica" works equally well in the frigid air of the Antarctic as well as under the scorching sun of the equator.

Size: 5-3/16 x 2-3/16 x 1-3/16 in.
Weight: 15 oz.
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One Load: 36 pictures.
Focal-Plane Shutter: coupled with film transport eliminates double exposure.

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Europe's most northern restaurant is to be established at North Cape, in Norway, chiefly for patrons who visit the region to see the midnight sun.

Baby silkworms can only suck the juice from young tender leaves of the mulberry tree, but as they grow older they must be fed the older leaves.

An international expedition organized in Russia plans to explore the unknown territory of the highest mountains in that country.

The dodo was wiped out of its home on the island of Mauritius chiefly as a result of hogs which were brought there in the sixteenth century by Dutch sailors.

The Home Library

Archæology

JAMES J. MONTAGUE, in the *New York Herald-Tribune.*

In Ur, the antiquarians say,
The only books were made of clay,

And, baked in fires of reeds and sticks,
In course of time were turned to bricks;

And of these square and shiny tomes
The Urians built their happy homes.

And when he stayed at home at night
An Urian took a taper light

And with a ladder close at hand
Against the lettered wall to stand

Would, caterpillarlike, advance
And read his favorite romance.

And when at last he'd gone through all
The books composing every wall,

His mind more fully to improve,
His only recourse was to move

Around and 'round and 'round and 'round
Where other volumes might be found.

If I had lived in Ur, I'm sure
That when I'd read the literature

Upon the wall of house or flat
I should have let it go at that;

Of education I approve.
But, golly! How I hate to move!

Science News-Letter, August 25, 1928

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Cancer Control By Blood Alkalinity

Chemistry

Concluding sessions of the American Chemical Society Institute at Evanston, Ill.

Cancer is associated with and possibly controlled to a large extent, by the relative alkalinity of the blood. This discovery was revealed by Dr. Ellice McDonald, chairman of cancer research of the University of Pennsylvania, in an address given before the American Chemical Society Institute.

Dr. McDonald flatly rejects the germ theory of cancer. At the same time he discounts the idea that cancer cells are of some abnormal species foreign to the human body.

A cancer cell is simply an ordinary body cell which is compelled to live in the wrong liquid environment. The trouble in such liquid medium comes mainly from excess of alkali, coupled at the same time with a low content of calcium in the blood—two factors closely inter-related.

The much-disputed radium and X-ray treatments for cancer are successful, in a limited number of cases, mainly in so far as they reduce the alkalinity of the blood. Experiments have demonstrated an appreciable rise in hydrogen-ion concentration—that is, relative quantity of acid in the blood—following irradiation. It is still not clearly demonstrated how or why the powerful rays should succeed or fail in a given case.

'Tis an ill wind that blows nobody good. People cursed with "acidosis" are found by Dr. McDonald to be practically immune from cancer. The blood of such individuals, who are usually of sedentary habits, may reach the figure of 7.2 on the biochemist's scale of acidity. A victim of cancer, however, would show a record of about 7.45. Simply expressed, the latter figure means nearly double the alkalinity (or half the acidity) of the value for the former case.

It is likely that families cursed with cancer are composed of persons sharing a family tendency to run low in bodily acid and high in alkali. It is accordingly quite unnecessary to suppose that the actual disease itself may be inherited. Only the tendency is passed on.

When a body cell finds itself in an abnormally alkaline environment, it simply acts like a yeast cell. It grows. Its cell wall expands and becomes more permeable. It divides, and great increases in number and mass occur. As with yeast again, the addition of sufficient acid stops the irresponsible, wild growth of the cells.

Dr. McDonald's revelations, supported not only by his Philadelphia staff but also by the recent biochemical discoveries of Rene Reding of Cancer Centre, University of Brussels, have thrown a large part of cancer research into the hands of the chemists. Search for new substances capable of correcting abnormal alkalinity is now projected. It is probably not sufficient merely to administer doses of some common acid to a cancer patient. It will be necessary either to attack chemically the fundamental source of alkali, or to foster acid production; these may be one and the same thing. With this will be joined an investigation of new calcium salts suited to the maintenance of decreased alkalinity.

Secret "dope" sold to private owners for addition (*Turn to next page*)

Rubber, Alcohol by Cathode Rays

Chemistry

A new apparatus by which the waste products of petroleum stills and coke ovens may be quickly transformed into rubber, alcohol, acetic acid and valuable drugs and perfumes is announced by Professor H. Plauson of Hamburg, Germany. The active agent is the cathode ray, which is produced in the ordinary X-ray tube but which is here brought into the open, and made applicable to industrial processes on a large scale by Plauson's tube.

This, he claims, is more economical and efficient than that invented by Dr. W. D. Coolidge, the American physicist, in 1925. In the German tube the window through which the rays pass is of gold-plated beryllium instead of nickel. The current required is only 200,000 volts, while Coolidge runs his voltage up to 350,000 or higher.

A further advantage claimed by Prof. Plauson is that he is able to direct and focus the rays upon the chemical to be acted upon by placing it in a powerful rotating electro-magnetic field, which greatly enhances their activity. Under this influence moist air is converted directly into nitric acid. Ammonia is made from a mixture of nitrogen and hydrogen. The unusable gases given off in cracking petroleum to get the highest possible yield of gasoline can be combined with hydrogen or chlorine gas to form useful products. Synthetic rubber may be made from isoprene with astonishing rapidity. The milk from the rubber tree is quickly converted to a solid and insoluble state without the use of sulphur and becomes brittle if exposed too long to the rays. The liquid forms of bakelite are hardened into the solid shape without heating. With coal, water and air as the raw materials it is possible to make alcohol, methanol, acetic acid, ether and all such products as were formerly produced from vegetation.

Dr. Plauson says that the use of the cathode rays opens a new era in synthetic chemistry which is being actively investigated by the Laboratory of the Society for Ray Chemistry at Hamburg.

The cathode rays consist of streams of electrons, the minutest of all particles, driven off from the cathode of a vacuum tube. They are not capable of passing through the glass of the tube, but where they strike they start a stream of X-rays which are immaterial and more speedy and so penetrating that they will pass through the human body and thus enable you to see pictures of your bones. The X-rays were discovered in 1896 by Roentgen, a German physicist, and in 1894, Lenard, another German, found that the cathode rays could be let out of the glass tube by a little window through a pane of aluminum foil.

But the most powerful X-ray tubes were invented by Dr. W. D. Coolidge of the General Electric Company, Schenectady; and in 1926 he got cathode rays in abundance by closing the end of the tube opposite to the cathode by a window of nickel, three inches in diameter.

The rays so released are found to have amazing effects on chemicals and on plants and animals. Caster oil, exposed to the rays, become solid. Acetylene gas was converted into a brown powder that could not be dissolved. When a rabbit's ear was placed in the path of the ray the hair came off, and when it grew again it was white.

Cancer Control by Alkalinity—*Continued*

to motor gasoline is at least a delusion and possibly a snare. Investigations show that chemicals of real potency in the betterment of automobile fuel are already well known and are now marketed by responsible manufacturers. There is no secrecy in their scientific formula. The search for anti-knock material has been highly scientific and exhaustive. It is probable that no ordinary person outside the great research laboratories has any chance at all of producing something of value to drop by the teaspoonful into a tank of "gas."

Among the chemicals recently sold widely without basis of merit are nitro-benzine and ortho - nitro - toluene, fixed up in perfumed and colored mixtures. These coal-tar products do nothing of significance to the gasoline and may be regarded as a fraud.

More deceptive is the widely known use of mothballs. These may be used either as such, or may be purchased at times in a crushed form under some non-descriptive trade-mark. Experiments carried out by the Bureau of Mines have revealed that mothballs, known to chemists as naphthalene, have practically no effect, good or bad, on the power qualities of gasoline. The substance does, however, increase the viscosity of the fuel so that the spray of the material in the motor carburetor is cut down in volume. Particularly in the Model T Ford it is well known that most owners waste a large part of their fuel by feeding too rich a mixture to the carburetor. Naturally, the addition of naphthalene cuts down the supply and actually gives more miles per gallon. One could have gotten the same result without expense merely by turning down the needle-valve. With the up-to-date high efficiency carburetors, however, the naphthalene is worthless.

It is considered possible that some anti-knock substance of lower activity than that of the present ethyl fluid may be developed and used in larger proportion because of possible cheapness. Such a preparation may be a compound of some cheaper metal than the lead now used. But there will be no mystery about its identity when it comes.

"No free samples!" was the caution to the audience at the Institute of Chemistry of the American Chemical Society, when they were shown various types of synthetic gems by Frank B. Wade of Indianapolis.

Mr. Wade reviewed the history of the making of gems, from the first much-disputed rubies from Geneva in 1885 to the present time, when chemically genuine rubies and sapphires have become commonplaces of the market, and even the most prized of all sapphires, the clear blue, can be produced at will.

Tungsten, a few years ago so rare that it was a curiosity even to chemists, is now a household necessity and a household word. Its near relatives, tantalum, molybdenum and columbium, while not so universally familiar, are now produced quite as readily and are finding an increasing use in industry, declared Dr. C. W. Balke, of Highland Park, Ill.

The handling of these metals on an industrial scale presents its difficulties, Dr. Balke said. The melting points are among the highest known for metals, and in order to prevent oxidation during melting, the process has to be conducted in a vacuum or under an inert gas, such as neon or nitrogen.

Science News-Letter, August 25, 1928

Radium Power

Physics

Sir Philip Gibbs, in *The Day After Tomorrow* (Doubleday Doran):

Radium heat, we are now told, is a third of a million times as great as the same amount of coal combustion. A pound weight could be made to do the work of 150 tons of dynamite. There is an unceasing supply of this energy in the matter that lies around us. If the scientists can get hold of it, liberate and utilize that atomic force—some of them think they are getting close to the secret—mankind will be put into possession of power so illimitable that all previous forms of energy such as coal and oil and water will become negligible and man himself will be the master of the very source and origin of power.

Science News-Letter, August 25, 1928

A wolf family may consist of as many as 12 pups.

Hardwoods from New Zealand have been successfully made into good newsprint paper at the U. S. Forest Products Laboratory.

The early Greeks regarded sitting on the ground as ignoble, and this position was usually taken only by mourners and suppliants.

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ADDRESS

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How Eyes of Races Differ

Pharmacology

From the annual meeting of the American Pharmaceutical Association at Portland, Maine, this week.

The familiar "drops" which the doctor puts in your eyes before examining them do not have the same effect of enlarging the pupils in eyes of other races, members of the American Pharmaceutical Association were told at their annual meeting. Chinese, for instance, and negroes are not so affected, Dr. K. K. Chen and Edgar J. Poth of the Johns Hopkins Medical School discovered. The reason for this peculiarity of Chinese and negro eyes is not known.

In the study a very delicate instrument, called a filar micrometer, which measures to one-hundredth of a millimeter, was attached to a telescope and used to measure very accurately the dilation of the pupils under controlled illumination. Five kinds of "drops" were studied—synthetic, natural and pseudo-ephedrine, and cocaine and euphthalmine. The last two are in more general use.

For the examination of Chinese and negro eyes there remain two solutions, homatropin and atropine, which do dilate the pupils. However, these two are dangerous for persons who have an eye disease called glaucoma.

Polar Expedition Lost

Exploration

No word has been heard since March from the scientific expedition which set out for the Taimyr Peninsula, one of the most remote points in northern Siberia. The expedition, consisting of Tolmachev. the Secretary of the Polar Committee of the Russian Academy of Sciences, Zoologist Rogosov, and Astronomer Malzev, set out early in the year to reach this Arctic peninsula by crossing the Siberian plains. It was the first attempt to gain the Taimyr region overland.

Inquiries have been sent to all parts of the region where the expedition may be traveling. No northern station of the U. S. S. R. has been in communication with the radio station of the explorers.

The only inhabitants of the peninsula who might aid a stranded party are a few wandering Mongols.

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"Alliances between pure and applied sciences are as dangerous as those of spiders, in which the fertilizing partner is apt to be absorbed."

—William Bateson.

Of the 1,177 different kinds of trees that are found in the forests of the United States, 137 have special medicinal virtues, Prof. Ernest F. Stuhr of Corvallis, Oregon, told members of the American Pharmaceutical Association. Prof. Stuhr has made a comprehensive investigation of all the trees in the country which are now or may be of medicinal value.

Synthetic ephedrine has little difference in action from the natural product made from the Chinese herb Ma Huang.

Dr. Chen reported the results of investigations on this drug, which is used extensively to relieve hay fever and asthma, to dilate the pupils of the eyes before examination and to contract congested membranes of the nose.

Qualitative and quantitative tests indicate that the two drugs have almost the same properties. In the treatment of asthma, the synthetic drug appears to have a weaker action than the natural. In the effect on the membranes of the nose the two products are similar.

Science News-Letter, August 25, 1928

Mathematical-Minded

Psychology

Born mathematicians, who think easily in mathematical terms, are to be sorted out from ordinary mortals who think in words, by tests now being developed at Cooper Union by Dr. Carl Brigham, of Princeton. The tests on which Dr. Brigham is working are designed to pick out promising engineering students from applicants who are destined for failure.

Success of students at engineering courses cannot be predicted by testing their general intelligence, he has concluded. Most of the intelligence tests depend on verbal thinking.

"We are now hot on the trail of a good test for mathematical thinking," said Dr. Brigham. "We believe it is quite possible for a student to study algebra and geometry in high school and to pass satisfactory examinations in those subjects just after he has studied them, without incorporating any of the mathematical methods of thinking into his own intellectual organization."

Science News-Letter, August 25, 1928

The rate of twin births is unusually high in Ireland.

Nature Ramblings

By Frank Thone

Natural History

Kingfisher

Late summer brings a relative silence in avian musical circles, and we are apt to forget about the birds, or to think they have already gone away. Nevertheless, they are still here, only now, like well-behaved children of a past generation, they are to be seen (if you look sharp) and not heard. The summer bird observer still uses his ears, but his eyes have a larger proportion of the work to do than they had in April and May.

An easy object for this "birding by eye" is the kingfisher. He is no shy lurker in coverts, nor does he camouflage himself in mottled brown or gray to blend into a treetop or dry pasture background. He shines boldly in enamel colors, and sits out on a jutting stump over the water where anybody can look.

He's not there for the purpose of getting himself admired, of course. He is doing some looking himself—looking for his dinner. For the kingfisher is a fisher in fact as well as in name. and as patient and motionless while waiting for his quarry as St. Izaak Walton could wish the best of his featherless worshippers to be. Silently he sits there for many minutes, until a fish of a size he thinks he can handle swims within range. Then, literally a blue flash, he dives. A white splash, and the kingfisher emerges, the captured fish in his strong beak. It is seldom that this living fish-spear misses.

The kingfisher does not confine his diet entirely to fish. Crayfish, frogs, even large beetles and other insects, all find their place in his larder. One or two species of kingfisher even do considerable foraging in the woods for the more usual insect prey of other birds. Due to his occupation, the kingfisher must be a solitary. Fishing is not a gregarious occupation.

Science News-Letter, August 25, 1928

"No New Thing"

Philosophy

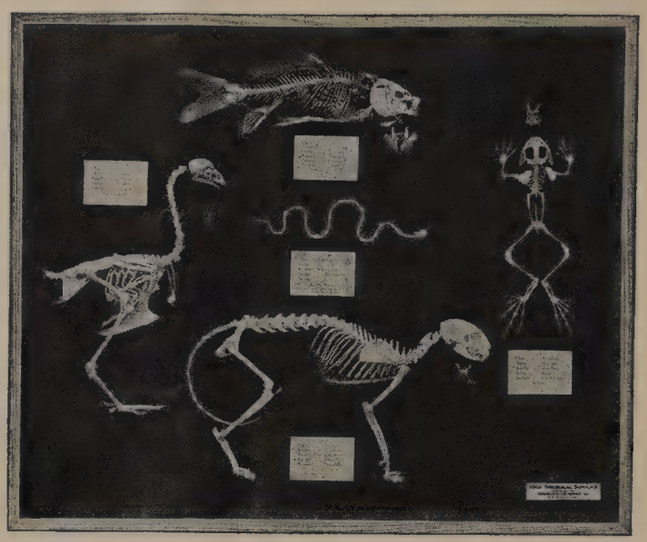
F. C. KOLBE, in *A Catholic View of Holism* (Macmillan):

How Aristotle and the Scholastics would have modified their theory of Matter and Form if they had known the results of modern analysis it would be idle to discuss. In practice the distinction is perceptible only by intellect and is hardly expressible in words. Science has now resolved all the tangible universe into atoms of some ninety different kinds. It, moreover, now claims to have resolved all atoms into nuclei and electrons. Further, they suspect that these electrons (and I suppose nuclei also) are nothing but vortices of the ether which we are obliged to postulate as a medium for the transmission of waves of light and other "forces." That is to say, they have reduced all matter to a basic indefinable subsance indefinitely varied by forces playing upon it. Their formula then is that the visible world is equal to ether *plus* combinations of forces (which make wholes or forms). Aristotle's would be that the visible world is equal to *materia prima* plus its moulding forces. He would say: "Your formula is only one step in front of mine, for your ether is equal to *materia prima* plus the one form of capacity for transmitting force."

There has of late been a rebellion against the victorious ether, and General Smuts takes up a doubtful stand. But if this ether is dethroned, we shall have to substitute for it another vague substance with exactly the same quality of elasticity; and we may as well call the new substance by the same name. In that case the difference of ultimate basis between Lord Kelvin and Aristotle becomes very filmy. I wrote a paper on the subject in the *Dublin Review* many years ago, but I never heard if anybody read it besides the printers. At that time my paper, originally read for the Royal Society of S. Africa, was pooh-poohed as "metaphysics". But medievalism is coming into its own. *Materia prima* is just as much science as ether is.

And the whole is not merely the sum of the parts. Nor is it anything superadded to the parts. It *is* the parts in their co-existence and co-activities. This General Smuts says over and over again almost in the words of St. Thomas Aquinas himself.

High Grade Prepared Skeletons



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A cold damp spring has cut down by 40 per cent. the expected harvest of roses for rose oil in Bulgaria.

Geologists say that a tunnel under the British Channel from Dover to Calais is a practical project.

The oldest known recipe for making perfume is in the thirtieth chapter of Exodus, in the Bible.

Marshall Foch recently stated that no new strategy of warfare has developed since the days of Hannibal.

Despite the chilly name of Iceland, the temperature at its capital, Reykjavik, rarely goes below freezing.

The congestion of the Chinese population is attributed to the majority of the people being crowded into one-third of its territory, chiefly because of poor transportation facilities.

Negro children are less likely to be attacked by measles than white children, but the disease goes harder with the negro child.

BINDER COVERS

FOR

SCIENCE NEWS-LETTER

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FIRST GLANCES AT NEW BOOKS

CARNACK, THE LIFE BRINGER—Oliver Marble Gale—*Wise* ($3). The home life of one of our Stone Age ancestors. Interpretative accounts of the manners and thoughts of extremely primitive ancient men generally lack the dramatic force of real reports of remarkable new-found cave paintings, graves, and household possessions. Still, unless an individual has scraped up acquaintance with prehistoric men sufficiently to picture for himself the people who used the flint axes, and who made the strange drawings, he will probably never see why such things are so interesting to some people. For this type of reader, with hazy ideas about the roots of his family tree, this book supplies just the sort of general background information to make a cave man seem like a human being. The foreword by Dr. A. V. Kidder is an interesting endorsement of the book.

Anthropology
Science News-Letter, August 25, 1928

THE REDEMPTION OF TYCHO BRAHE—Max Brod (Trans. Felix Warren Crosse)—*Knopf* ($2.50). Despite the fascinating history of some of the heroes of science, novelists in general have neglected them in their search for material. In this modern German novel, however, Tycho Brahe, greatest and last of the pre-telescopic astronomers, appears as a living personality, not as the demi-god which sometimes represents him. His meeting with Kepler, following his expulsion from Uraniborg and his coming to Prague to join the court of the Emperor Rudolph, and the influence of the two men on each other furnish the theme of the book. Tycho represents the old school of science—Kepler the new, but in the end they both see that they are seeking the same ideals.

Astronomy
Science News-Letter, August 25, 1928

THE AGE OF REASON—Philip Gibbs—*Doubleday, Doran* ($2). An engaging novel whose concluding chapter leaves one feeling that the deep-seated wish for immortality colored and capped a good story. But that will depend upon whether you side with Hesketh, whose religion was biology, Margaret, whose love for Hesketh did not include his science, Viola the pagan goddess, Richard the convert to Catholicism or Guy who failed to conquer his life problem.

Fiction
Science News-Letter, August 25, 1928

INTERNATIONAL CRITICAL TABLES Vol. IV—National Research Council—*McGraw-Hill* ($12). This installment of this standard reference work is devoted to phase-equilibrium data (especially solubilities), osmotic pressure and properties of surfaces (surface tension, etc.) It joins the three previously published volumes in the reference librarian's heaven.

Physics—Chemistry
Science News-Letter, August 25, 1928

THE NEW QUANTUM MECHANICS—George Birtwistle—*Cambridge University Press* ($5.50). For those who wish to keep up with the new physics, for those who read fluently the shorthand of equations, for those who walk with Schrödinger, Einstein, de Broglie, Heisenberg, Born and other pioneers, this book is a necessity.

Physics
Science News-Letter, August 25, 1928

ORGANIC CHEMISTRY—James Bryant Conant—*Macmillan* ($2.60). In this chemical world today structural formulæ of the compounds of carbon are just as important as mathematical equations. And since they are the wands of the organic chemist, they may seem to have more application to a materialistic world. This textbook will therefore interest those seekers of chemical knowledge who under the influence of the spectacular accomplishments of chemistry want to know how sticky dirt is made into wealth and beauty.

Chemistry
Science News-Letter, August 25, 1928

A STATISTICAL STUDY OF VIRGINIA—Wilson Gee and John J. Corson, 3d—*Institute for Research in the Social Sciences.* This first monograph from the institute, at the University of Virginia, is a careful and valuable analytical study. The authors point out that Virginia is in a transition period and that statistics show where the state is backward and where good progress is being made. The bulletin is addressed to the average citizen, and is intended as a background of information "upon which may be built a program of betterment for the whole-sided development of the State of Virginia."

Sociology
Science News-Letter, August 25, 1928

THE STORY OF GEOLOGY—Allan L. Benson—*Cosmopolitan* ($4). A well-illustrated popular presentation of the main facts of geology.

Geology
Science News-Letter, August 25, 1928

PSYCHOLOGY, A SIMPLIFICATION—Loyd Ring Coleman and Saxe Commins—*Boni and Liveright* ($3). The demand frequently heard for a book on psychology that an average reader can understand is receiving attention. Here is a surprising amount of current scientific knowledge compressed into a limited space, and done in readable fashion. It gives the reader an introduction to some of the more important schools of psychology. It discusses mental abnormalities and diseases, criminal behavior, animal psychology, the development of children. There is a chapter devoted to those by-paths of the mind that fascinate and perplex the public—hypnotism, dreams, and spiritualistic manifestations. A selected bibliography at the end of the book, with an explanatory note on each suggested reference, enables the reader to extend his acquaintance with any of the topics that particularly stir his interest.

Psychology
Science News-Letter, August 25, 1928

DIABETIC MANUAL FOR PATIENTS—Henry J. John—*Mosby* ($2). Simple discussion of the cause and course of the disease, its treatment, insulin, and dietary factors. Charts and tables of carbohydrate content of foods, diets and recipes are included in this useful book.

Medicine
Science News-Letter, August 25, 1928

YEARBOOK OF AGRICULTURE, 1927—U. S. Dept. of Agriculture—*Govt. Printing Office* ($1.50). What's New in Agriculture, to the extent of 1,234 pages. Everything from p. 723 on is statistical tables and index. Close-packed fact, all of it useful to somebody.

Agriculture
Science News-Letter, August 25, 1928

OFFICIAL YEAR BOOK OF THE COMMONWEALTH OF AUSTRALIA, 1927—Commonwealth Bureau of Census and Statistics, Melbourne. Contains a mass of useful information on the history, population, resources, etc., of the great Commonwealth of the South.

Sociology—Economics
Science News-Letter, August 25, 1928

"J. T., JR."—Delia J. Akeley—*Macmillan* ($2.25). A story of African exploration and hunting, centered around the biography of a monkey.

Zoology
Science News-Letter, August 25, 1928

"Nothing But the Truth"

Psychology

LOYD RING COLEMAN AND SAXE COMMINS, in *Psychology, a Simplification* (Boni and Liveright):

The contributions of psychology are not by any means limited to the field of industry. They pervade every form of human activity. All the professions take cognizance of the importance of the psychological problems with which they are confronted. The law, medicine, the arts and humanities, education, public opinion as it is molded by the media of press and pulpit, all these are implicitly formed and nourished by psychological considerations. In some of these activities, this phase is ignored; in others, only the mildest concessions are made and, to their own loss, the contributions of this struggling science are accepted on suffrance.

The law, which presumably deals with facts, and not with suppositions, which recognizes precedent and authority, and not mere hearsay, must, for these reasons, give careful consideration to the facts of the mind. Perception, memory, the evidence of the senses, and the whole complicated mechanism of emotional responses are basic to the accurate rendering of justice. Under the scrutiny of the psychologist, evidence becomes either illusion or reality.

When a point is at issue and testimony will clarify it, the conflicting reports can be sifted by definite psychological methods. For the most part, the witness relies upon sense records. He is convinced that he has seen, heard, or felt what he recounts. It is no violation of the oath to insist that what one has felt is wet, when in fact it was dry. The psychologist may not be able to prove to the satisfaction of a jury that the witness was mistaken, but he can prove that errors in sense perception are possible, even with the best will in the world to be accurate. The implication is manifest that evidence depending entirely upon perception is unreliable.

The myriad illusions which get themselves aired on the witness stand need analysis. It may be important to the verdict in a case whether a witness swears that he saw, in a dim light, a person in red or one in blue. It is hardly likely that judge and jury would be aware that in a faint light a sensation of blue is distinguishable, whereas the sensation of red is not. In a murder case, the fate of the defendant may depend upon the hearing of a shot by a witness. To avoid circumstantiality, it may be necessary to be precise about the direction from which the shot came. The witness may swear that he heard the shot directly in front of him. From a psychological point of view, such testimony is worthless because it is impossible to judge whether sound originates in front or back.

All observations are colored by associations and suggestions. The man who heard the shot may have turned and seen the defendant in the act of putting his pipe in his pocket. The pipe became a revolver in his aroused imagination. The shot really was fired in front of the witness. But, by the combination of faulty sense perception, association and suggestion, the inference grew into honest conviction that the man behind him had committed the crime.

If the senses are at fault, memory is utterly unreliable. And it is memory upon which all testimony is based. The story is told that Sir Walter Raleigh, while beguiling the heavy hours of his imprisonment in the Tower of London, tried to write a history of civilization. One day a fight occurred in the courtyard which was witnessed by all the prisoners. At dinner, when they came together in the mess hall, versions of the fight were as numerous as there were prisoners who had seen it. Being an honest man, Sir Walter realized the futility of his historical task. If men could not report what they had personally seen, with what conscience could he record that which his erring senses could not verify? Accordingly, he destroyed his manuscript.

Imaginative ideas slip into the consciousness easily. Once in, they grow to the magnitude of convictions. It is almost impossible to determine what is remembered, perceived, or imagined. In Titchener's laboratory, careful experiments revealed that subjects, under certain conditions, were unable to differentiate between objects actually seen and those imagined. The problem of the accuracy of memory will not be solved by taking it for granted, as it is in courts of law, but by some test yet to be devised by the psychologist.

The law should make every possible effort to detect crime. It condones every physical method so long as there is a justification in precedent for it. Yet it concedes nothing to the possibilities of the psychogalvanometer, or even in the word association test of the psycho-analyst. The guesses of the past are more acceptable to the courts than the verifications of the experimental laboratory.

Science News-Letter, August 25, 1928

Folklore of the Teeth

Anthropology

LEO KANNER, in *Folklore of the Teeth* (Macmillan):

Sometimes the folk-prescriptions against toothache seem to be so strange that it almost may appear that they might have been intended as jokes or as a humorous criticism of superstitious magics. Yet they are meant to be taken very seriously. To secure yourself from toothache you will be told in Sussex to be careful always to put on the right stocking before the left, and to put the right leg into the trousers before the left. But in Shropshire, for instance, exactly the contrary is enjoined. In Swabia you should leave the bed in the morning with the left foot first and also put on the left stocking, the left shoe, the left sleeve before the right; at night you should take off your clothes in the same order and go to bed with the left foot first. In the northeast of Scotland it is thought a good cure for toothache to go between the sun and the sky to a place where the dead and the living cross, and lift a stone from it with the teeth.

The most frequent thing people do if they have pain in their teeth is that they wrap a handkerchief or a towel round the cheek. This towel is in cartoons and in so many paintings the chief characteristic of one suffering from toothache. In Franconia, the dirtier the towel, the better the effect will be on the teeth.

Science News-Letter, August 25, 1928

Sentiment against public display of royal mummies is growing in Egypt.

More than half of Arizona is over 5,000 feet above sea level.

The Control of Scarlet Fever

Medicine

By GLADYS H. DICK, M. D.
Fellow in the John McCormick Institute for Infectious Diseases, Chicago.

The first part of this article, in which Dr. Dick told how she and her husband established the nature of scarlet fever, was printed in the March (1928) issue of *Medical Progress*, the publication of the American Association for Medical Progress that is now merged with the SCIENCE NEWS-LETTER. For the convenience of those who wish to read the first installment, a limited number of copies have been secured and will be sent upon request for 10 cents in stamps to cover handling and postage.

This second part relates the development and application of a scarlet fever antitoxin.

While the determination of the cause of scarlet fever was important scientifically, it would not have been of much practical value without the discovery of the specific toxin of the disease. It was the discovery of the toxin which enabled us to develop:

First, a skin test to determine which individuals are susceptible to scarlet fever and which are immune.

Second, a method of immunizing susceptible persons against scarlet fever so that they do not contract the disease on exposure to it.

Third, an antitoxin specific for scarlet fever which is used therapeutically to treat persons who are already sick with scarlet fever, and prophylactically as temporary emergency protection after exposure, in suitable cases.

Fourth, a method of recognizing scarlet fever streptococci and distinguishing them from other streptococci, such as are found in erysipelas and puerperal sepsis.

These four applications of the discovery of the specific toxin of scarlet fever furnish the means of controlling the disease. Sufficient time has now elapsed to permit the determination of their practical value.

Until the results of this work were available, there had been no way of distinguishing the streptococci associated with scarlet fever from the hemolytic streptococci found in other diseases. There is nothing characteristic about their appearance or manner of growth that distinguishes them. Attempts to differentiate them by means of immune reactions had not been successful. But the discovery that hemolytic streptococci are capable of producing potent toxins specific for certain diseases enabled us to develop a method of identifying the streptococci by means of their toxins and corresponding antitoxins. The toxin in question is mixed with a known antitoxin, such as scarlet fever antitoxin. If it is neutralized by scarlet fever antitoxin, the toxin

DR. GLADYS DICK, co-originator of the Dick test for scarlet fever susceptibility, and of scarlet fever antitoxin

is shown to be scarlet fever toxin and the hemolytic streptococcus which produced it is identified as a scarlet fever streptococcus. This method of identifying hemolytic streptococci by means of their toxins has opened up a new field for medical research, in which many investigators are now working. By applying this method, Birkhaug and Amoss have been able to show that the hemolytic streptococcus of erysipelas produces a specific toxin and they have been able to obtain the corresponding antitoxin. Others have reported that the hemolytic streptococci found in child-bed fever produce a specific toxin for this disease. Thus the whole problem of hemolytic streptococcus infections, in which so little progress had been made, is apparently in the process of being solved by application of the new methods developed in the research on scarlet fever.

Scarlet fever antitoxin is produced artificially by injecting human beings or horses hypodermically with the sterile toxin in gradually increasing doses. If properly carried out, this treatment stimulates the production of scarlet fever antitoxin and confers immunity against scarlet fever without inconvenience or danger to the individual immunized.

For the production of antitoxin on a large scale to be used in the treatment of scarlet fever patients, horses are employed because it is possible to obtain larger amounts of antitoxin from them. Gradually increasing doses of the toxin are given until it is found that the horse is producing a good antitoxin. He is then bled and the serum, or fluid portion of the blood, which contains the antitoxin, is separated from the blood cells. This serum is subjected to a chemical process which concentrates and refines it. It is then standardized against the toxin and is ready for use in the treatment of scarlet fever patients.

There is considerable variation in the severity of scarlet fever. There are mild forms in which the chief object in giving antitoxin is to reduce the chances of complications to a minimum. From such mild forms there are all possible gradations to the fulminating, toxic type in which the patient may die in a few days of the toxemia. The therapeutic dose of antitoxin adopted by the Scarlet Fever Committee is adequate for the ordinary mild to moderately severe attack. Within 12 to 18 hours after the antitoxin is given in an early case there is an improvement in the general condition of the patient. The fever subsides and the rash begins to fade. In more severe cases, especially in those complicated by sinus infections, it is sometimes necessary to give a second dose of antitoxin 18 to 24 hours after the first dose. In extremely toxic cases, with high fever and delirium, it is advisable to give two therapeutic doses at once. Occasionally one sees cases of scarlet fever of several days' duration in which the streptococci have found their way into the blood and the heart and kidneys are so badly damaged that no method of treatment can be expected to effect a cure. An effort should be made to administer scarlet fever antitoxin early enough to prevent such conditions.

It has been shown that properly prepared and standardized scarlet fever antitoxin, given in adequate dosage early in the disease, shortens the course of scarlet fever and reduces the frequency and severity of complications. In order to be most effective, the antitoxin should be given as soon as the rash begins to appear. With every day of delay in administering the antitoxin its benefits diminish.

In a series of three hundred scarlet fever patients treated with antitoxin and compared (*Turn to next page*)

The Control of Scarlet Fever—*Continued*

with a similar series of three hundred cases treated without antitoxin, the incidence of complications was 8 per cent. in the antitoxin series and 38 per cent. in the series which received no antitoxin. Gordon has reported another series of 500 cases treated with antitoxin and 500 treated without antitoxin. He found a similar reduction in the number and severity of complications in those treated with antitoxin.

In addition to its use in the treatment of scarlet fever, the antitoxin may be given prophylactically in selected cases as an emergency measure to prevent the development of scarlet fever in susceptible persons already exposed to the disease and infected with scarlet fever streptococci as shown by nose and throat cultures. Such passive protection with antitoxin is purely an emergency measure and it must be kept in mind that the protection is only temporary, lasting at the most two or three weeks. As soon as the foreign serum is eliminated from the body, the individual again becomes susceptible to scarlet fever and may contract the disease again.

The Only Permanent Protection

The only permanent form of protection is that furnished by active immunization with graduated doses of scarlet fever toxin which stimulates the individual to produce his own antitoxin.

Not everyone is susceptible to scarlet fever. Some have spontaneously acquired immunity to the disease through having had an attack or by repeated exposure. To learn which individuals in any group are susceptible so that they need to be immunized and which ones are immune and do not require immunization, skin tests are made. This is accomplished by injecting just beneath the upper layer of the skin exactly one-tenth of a cubic centimeter of a dilute and accurately standardized solution of scarlet fever toxin. The injection should be made on the anterior surface of the forearm, at the junction of the upper and middle thirds. The result of the test is observed between twenty and twenty-four hours later. This observation should be made in a bright light in order not to overlook slightly positive reactions.

An area of reddening one centimeter in any diameter constitutes a positive reaction and indicates some degree of susceptibility to scarlet fever. There is no induration in the positive tests—only reddening with slight superficial swelling and positive reactions have usually disappeared in 30 to 48 hours so that the results of observations made more than 24 hours after the test would not be reliable. On the other hand, the observations should not be made too soon—not earlier than 20 hours. According to the degree of susceptibility of the individual, the skin reaction may vary in color from faint pink to intense red; in size up to five centimeters in diameter.

Incidence of Susceptibility

In a series of skin tests made in thirty thousand persons, it was found that infants under 6 months showed less frequent and less strongly positive reactions than older children. During the first year there is apparently a gradual increase in susceptibility. Between one and six years of age, 90 per cent. of children living under good conditions may show positive reactions indicating that they have not yet had scarlet fever. After the children start to go to school they are exposed to scarlet fever from time to time and some of them contract the disease. This results in a decrease in the incidence of susceptibility with increasing age. The more crowded the schools and living conditions, the more rapidly this spontaneous immunization takes place due to the fact that crowding favors the spread of infection. Extremes of susceptibility due to differences in living conditions are illustrated by two institutions. The first is an orphanage of 3,000 where the children live in cottages and are out doors most of the time when they are not in school. In this orphanage 63 per cent. were found susceptible to scarlet fever, indicating that 37 per cent. had had the disease in some form. The other institution was one of 3,000 feeble-minded children who were kept indoors in crowded buildings. Here only 13 per cent. were found susceptible, showing that 87 per cent. had had scarlet fever.

Science News-Letter, August 25, 1928

Footnote on Scarlet Fever

Medicine

Editorial comment on Dr. Dick's article, prepared by the American Association for Medical Progress.

In the article on the Control of Scarlet Fever, by Dr. Gladys H. Dick, the second installment of which appears in this number of SCIENCE NEWS-LETTER, no attempt was made to indicate the many important ramifications which the study of this disease has had to pursue, since experimental methods were systematically applied to it.

Earlier experimenters had succeeded in obtaining a pure culture of streptococcus germs which produced the characteristic toxic symptoms of scarlet fever. Others had used both the toxic filtrate from a culture and the bacteria themselves for the immunization of horses in such manner that the serum would neutralize the poisons of scarlet fever or destroy the bacteria supposed to cause the disease. Moser of Vienna in 1902 inoculated a horse with a mixture containing both bacteria and the toxic products formed by the bacteria growing in broth. Serum subsequently produced from the horse's blood was found to have excellent therapeutic value in treating scarlet fever.

Savchenko a few years later showed that in scarlet fever there are present both the local action of bacteria and the diffusion of a poison or toxin. In 1907 Dabritschewsky, another Russian, developed an experimental vaccine for immunizing against scarlet fever by using a combination of the poison and killed streptococcus bacteria.

In spite of these successes with vaccine and therapeutic serums, there still remained doubts in many minds as to the specific nature of the bacteria responsible for scarlet fever and as to other details in the disease process. It had not been possible to produce the disease by inoculating experimental animals. Doctors George and Gladys Dick were the first to subject volunteers to deliberate infection, and they developed the use of minute quantities of pure scarlet fever toxin, injected into the skin, as a test of susceptibility to the disease.

Parallel with the work of the Dicks in this country was the experimental research of A. R. Dochez and associates, which resulted in the production of a scarlet fever antitoxin by injecting into horses successive small amounts of melted nutrient agar carrying scarlet fever streptococcus. The serum produced in this manner was found to be remarkably effective in clearing up scarlet fever within a few hours, even when highly diluted.

Science News-Letter, August 25, 1928

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